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Learning Pharmacology in Mexico: Laboratory Instruction

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Abstract

A steep decline has occurred in the number of hours devoted to basic sciences laboratory instruction in most medical schools. This trend seems to be inevitable because basic science departments in many medical schools are probably not capable of running an animal laboratory; hence, computer simulations have substituted live animals in medical laboratory learning. This article describes the laboratory program developed at our Pharmacology department. The laboratory manual contains a total of 33 computerized laboratory sessions; many of them are used to reinforce basic pharmacology concepts and principles, whereas others emphasize application of the scientific method to pharmacological and clinical problems. This program constitutes an effort for a better formative and less factual instruction to medical students.

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1. Introduction

The relevance of basic science in medical education has been recognized for centuries, and the importance of exposing medical students to science was acknowledged and reinforced by the recommendations of the Flexner Report (1910). Flexner proposed that medical education began by providing a strong foundation on basic medical science, followed by the study of clinical medicine in an atmosphere of critical thinking at departments that could afford adequate time and facilities for doing research. As a result, medical schools reformulated their curriculum, educational programs stressed their biological basis, medical schools narrowed their links with universities, and

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departments became centers of scientific research. Since then, traditional medical education has been divided into preclinical and clinical subjects (Weatherhall, 2011); within this scheme, the first terms of undergraduate medical education usually concentrate on basic science, whereas subsequent ones focus on clinical sciences and clinical training (Dahle, Brynhildsen, Behrbohm-Fallsberg, Rundquist & Hammar, 2002). Although there have been several modifications, this program has formed the basic pattern of medical education for the last 100 years, and certainly, its introduction has led to improvements on standards (Bligh, 2003). However, in the 1950s, medical educators began to question the Flexnerian model, and numerous reports from esteemed groups called for major reforms in physicians' education. Many schools sought for ways in which basic science learning could be taught along with clinical subjects rather than preceding them (Bligh, 2003; Weatherall, 2006).

In a field as dynamic as medicine, it would be absurd to expect that, after a century, the Flexnerian scheme would remain unchanged (Weatherhall, 2011). During the last fifty years, the biomedical knowledge has grown exorbitantly, and nothing suggests that there is a limit to it. Some disciplines have emerged (cellular biology, molecular biology, immunology, genetics, and genomics), and changes in the epidemiological profile, health-care systems, practice of medicine, and technology have occurred (Clough et al., 2004; Finnerty et al., 2010).

Given this new reality, many medical schools reformulated their curriculum. Just to mention are the reforms that have sought the vertical integration, that is, integration between clinical and basic science sections of the curriculum and the horizontal integration between different subject areas. The Case Western Reserve Medical School introduced a system-based curriculum in 1952; it combined the teaching of basic sciences and clinical medicine with patient care since the very beginning (Smith, 2010). Similarly, problem-based learning (PBL) was introduced by McMaster University in 1969, where self-directed learning is used to study a series of problems that define both the basic science and the clinical curriculum (Smith, 2010).

Both integrated and problem-based curriculums are associated with important reductions in the time allotted to individual basic science courses or even their disappearance (Vander, 1994; Seifer, 1998). Likewise, a steep decline has also occurred in the number of hours devoted to basic science laboratory instruction in most medical schools (Hotez, 2003). In some of them, laboratory exercises have been totally eliminated; thus, medical students are insufficiently trained in the skills, values, and habits of science.

Besides educational reforms, arguments against the presence of basic science knowledge in the medical curriculum have emerged, like the perceived lack of relevance to clinical medicine; the exponential growth of the biomedical sciences (Smith, 2010; Sweeney & MacLeod, 1999); and pressures to include in the curriculum communication skills, social sciences, and humanistic subjects (Smith, 2010). In fact, they have gained space in the curriculums at the expense of the basic sciences.

The disappearance of the basic science subjects from the medical curriculum is paradoxical because, nowadays, the value of the biomedical knowledge and the scientific reasoning for making medical decisions is more appreciated than ever (Brass, 2009).

To survive and to maintain its relevance and importance in modern medical education, three aspects related to basic sciences must be examined. First, it is challenging to incorporate in the medical curriculum all the new knowledge generated in the basic science disciplines (Clough et al., 2004). Presently, medical students do not have enough time to study all the material typically taught at medical schools, so it will also be difficult for them to study the new and rapidly expanding scientific knowledge of the basic sciences (Clough et al., 2004). To fix this situation, many authors have suggested the development of a core medicalized curriculum for all basic sciences that students could follow (General Medical Council, 2003; Nieremberg, 1990; Walley & Webb, 1997; Rodriguez, Vidrio & Campos-Sepulveda, 2009). By medicalized, we mean the essential, central concepts, principles, and details of basic sciences relevant to the clinical practice that every medical student should master before graduation (Rodriguez et al., 2009). Second, the integration of basic and clinical teaching in medical education is a pending task. An option that could be explored is the incorporation of the essentials of the biomedical knowledge to the teaching of clinical sciences (AAMC-HHMI, 2009) and, inversely, giving a clinical connotation to the biomedical knowledge of basic science. This only requires some imagination, not structural changes in the curriculum. Third, if the goal of medical education is to form inquisitive physicians and critical thinkers dedicated to lifelong learning capable of incorporating the scientific method to their medical practice, then laboratory training must be reincorporated and reinforced in medical education while, at the same time, highlighting the formative role of the basic sciences.